The Apache Longbow helicopter is important for preserving the Army's superior attack helicopter capability during the transformation.

Black Hawk fleets extends the life of these helicopters by an additional 20 years. Together, the Army's aviation recapitalization efforts ensure retention of key helicopter capabilities that support the full spectrum of operations.

The recapitalization of the Heavy Expanded Mobility Tactical Truck (HEMTT) and the reestablishment of the Hercules Improved Recovery Vehicle (IRV) program are two other noteworthy efforts. The HEMTT provides resupply support for combat vehicles, aircraft, and missile systems. This recapitalization program gives each truck an improved engine, anti-lock brakes, and a load handling system. It will reduce operations and support costs as well as improving fleet readiness. Reinvesting in the IRV program will provide the force a recovery vehicle capable of independently recovering an Abrams tank, an operation that requires two of the currently fielded M88 recovery vehicles. The IRV has better winch and lift capability than the current M88 recovery vehicle, as well as lower operations and support costs. Both the HEMTT and the IRV provide important logistical capabilities to the force.

Increasing Light Lethality

The systems that the Army is fielding and recapitalizing in support of Division XXI implementation will improve strategic responsiveness for mechanized forces. Acceleration of selected logistics command and control systems will enhance responsiveness for the entire force. Other adjustments to Army modernization planning aim to improve the lethality of today's most responsive forces—the Army's light forces—by increasing investments in a range of programs that provide improved fires and battlefield reconnaissance.

Acceleration of the Line of Sight

integrated GPS, improved electronics, and a Thermal Management System. Eventually, M1A2s fielded prior to SEP will be retrofitted to incorporate these enhancements. The Army will continue its efforts to upgrade its Abrams fleet into a mix of M1A2 (SEP) and M1A1D variants to optimize capability during the transformation.

In the aviation arena, two major recapitalization efforts that will support the transformation include upgrading Apache attack helicopters to the Longbow variant, and upgrading Black Hawk utility helicopters to the "L+" variant. The Apache upgrade will streamline logistics and maintenance requirements for the Apache by making it the standard attack helicopter across the force. It will also give all Army

attack helicopters the capability to employ the latest variant of the Hellfire missile. The recapitalization of the UH-60 Black Hawk fleet will make the Army's utility helicopter more reliable and capable by improving its rotor and engines. Funding for these upgrades will be consistent with the Aviation Modernization plan, scheduled for release later this year.

In the future, the Army plans to increase funding for the CH-47 Chinook to complete upgrades and recapitalization at an accelerated pace. The upgrade features a vibration reduction projected to reduce operations and support costs by more than 22 percent. It will also upgrade the cockpit to make it compatible with digital systems. Recapitalizing the Chinook and

The Line of Sight Anti-Tank system is capable of defeating all predicted armored vehicles, hardened bunkers, and reinforced buildings.

Anti-Tank (LOSAT) and the High Mobility Artillery Rocket System (HIMARS), along with the revalidation of the TOW Fire and Forget system, will enhance light force direct and indirect fire capability. The LOSAT consists of kinetic energy missiles (KEM), and a second generation, Forward Looking Infrared (FLIR)/television acquisition sensor, mounted on an air mobile High Mobility Multipurpose Wheeled Vehicle (HMMWV) chassis. The KEM defeats all predicted future armored vehicles, as well as hardened targets such as bunkers and reinforced urban structures. The LOSAT is readily deployable, and can be air-dropped or sling-loaded for helicopter transport. In the indirect fire arena, the HIMARS is a C130-transportable, general support (GS) rocket system for early entry forces. It is a wheeled version of the MLRS that provides high-volume artillery capability for initial entry operations. The TOW Fire and Forget system provides additional long-range anti-armor capability. Its fire and forget

technology increases both survivability and lethality.

For the future, the Army plans to increase funding for the Lightweight 155mm Howitzer, a towed howitzer that is deployable to any region and operates in most climatic conditions. It is lighter than current GS towed howitzers, but its range, accuracy, and durability are as good or better than current systems. The anticipated acceleration of the Lightweight 155mm Howitzer, along with the programs described previously, will support the transformation strategy by providing highly deployable, lethal systems for early-entry forces.

The Army will accelerate the procurement of a Tactical Unmanned Aerial Vehicle (TUAV) to improve battlefield reconnaissance. The TUAV program gives Army brigade commanders an organic capability to obtain real-time situational awareness and precision targeting data for areas not under observation by other friendly forces. As demonstrated during the recent Kosovo campaign, the

capabilities of the Army TUAV are a significant combat multiplier for the entire joint force.

Focusing Science and Technology

The systems described in the preceding pages provide important capabilities to meet Army goals and requirements during the transformation. As noted previously, the S&T required to field the Objective Force is still under development. The FCS program will focus S&T on the development of Objective Force capabilities.

The Army is pursuing a collaborative program with the Defense Advanced Research Projects Agency (DARPA) to investigate possibilities for FCS. The FCS program will develop innovative, multi-mission systems optimizing

The High Mobility Artillery Rocket System provides light forces with potent artillery fires.

commonality of components and subsystems, affordability, deployability, survivability, and lethality to meet ground force requirements for the Objective Force. The Army seeks systems that can be deployed by a C130, see before they can be seen, engage before they can be engaged, and survive a first round engagement. These systems must feature affordable sustainment, reduced logistics requirements, and a decrease in crew size as compared to current systems. To achieve this capability, the Army will accelerate the research and development of FCS. Several study contracts will be awarded this year, with the selection of two contractors in FY2002 for virtual prototype demonstration. The anticipated start point for development is FY2006 in order to equip the first unit in FY2012. The requirement for FCS with the desired characteristics will provide focus for developing the necessary S&T to support the Objective Force.

Restructuring and Divestitures

The Army has made some difficult decisions to restructure or divest a number of programs in order to provide some of the resources to support its transformation. The restructured programs are the Crusader and the Future Scout and Cavalry System. Divestitures include Prophet (Air), MLRS SmartTactical Rocket (MSTAR), Stinger Block II, Command and Control Vehicle (C2V), Grizzly Engineer Vehicle, Wolverine Heavy Assault Bridge, and the Army Tactical Missile System (ATACMS) Block IIA Missile. Although the requirements for these systems still exist, the Army's analysis concludes that restructuring or divesting them will free resources needed more urgently for the transformation. Even with these hard choices, the Army needs additional resources to execute its

transformation and will continue to work to resolve funding issues with the Administration and Congress.

Preserving Interoperability Within the Army and Between the Services

Preserving interoperability between elements in the transforming Army, as well as between Army forces and those

> Incorporating common technologies and components in multiple platforms across the force, conducting experiments, and training are three processes that assure interoperability.

of other Services and nations, is essential to sustaining readiness and implementing the Vision. Having the inherent ability for such interoperability enables several key Objective Force characteristics, such as responsiveness, lethality, survivability, and versatility. As it modernizes its forces, the Army maintains and validates its interoperability through the Army Enterprise Strategy (AES), experimentation, and training with other Services and allies.

The Army Enterprise Strategy

The AES is the capstone effort to unify and integrate a wide range of command, control, computers, communication, and intelligence information technology (C4I/IT) initiatives from the foxhole to the sustaining base. It meets the requirements of the Clinger-Cohen Act of 1996 by providing a coherent mechanism for the selection, management, and evaluation of information technology investments. The AES supports digitization by implementing a sound, integrated, information technology architecture (the Army Enterprise Architecture) and Horizontal Technology Integration (HTI).

The Army Enterprise Architecture (AEA) is a comprehensive blueprint for information systems that cuts across functional domains and Service boundaries. This blueprint is the basis for an information technology investment strategy that ensures the effective design and evolution of Army information systems. It is consistent with the Joint architecture. The AEA ensures that all Army systems that produce, use, and exchange information electronically adhere to established compatibility guidelines.

Horizontal Technology Integration is the application of common technologies across the force to increase force effectiveness. Such integration of common technologies and components on multiple platforms facilitates interoperability and reduces acquisition program costs. Formally proposed in 1993, HTI has been in effect in the Army for several years. A General Officer Working Group manages the program by reviewing candidates for HTI and making decisions on potential HTI programs. HTI is the preferred method for ensuring interoperability while achieving new or improved capability in weapon system programs.

Experimentation

Another useful technique for ensuring and validating interoperability is experimentation. As described briefly in the previous section on the Force XXI process, the Army has sponsored experiments ranging from large-scale AWE to smaller Advanced Technology Demonstrations (ATD's) and Advanced Concept Technology Demonstrations (ACTD's) for several years. Advanced Warfighting Experiments are full-scale, force-on-force exercises in which Army units employ new systems to provide feedback on system performance and employment. Advanced Technology Demonstrations evaluate the maturity of a technology and assess its potential application to a military need. Advanced Concept Technology Demonstrations are more like small-scale AWEs: they let units explore new tactics, techniques, and procedures while working with the materiel developer on the integration of mature technologies. Army experiments- AWEs, ATDs, and ACTDs—are generally overseen by one or more of the ten functional "battle laboratories."

Since being formed in 1992, Army Battle Labs have provided a mechanism for coordinating concept development, requirement generation, solution development, and operational testing. Interoperability is a key parameter in developing concepts, requirements, and materiel solutions. Experimentation provides important insights in this regard. Many of the operational and human factors affecting system characteristics and doctrine do not appear in isolated tests. The full implications, limitations, and strengths of a system emerge only when that system is employed in concert with other systems under demanding conditions. Experimentation is an important tool for assessing the interoperability impact of new systems on existing systems and functional areas.

The recent formalization of a Joint Experimentation Campaign Plan (JECP) will further the development of systems and procedures that enhance joint interoperability. While the Services have cooperated with and participated in other-Service experiments in the past, the establishment of a Joint Experimentation Directorate by the Joint Forces Command (JFCOM) provides a focus and structure that will improve interoperability. The JCF-AWE in September 2000, will be the first joint experiment endorsed by JFCOM. It will integrate distinct Service experiments through a common scenario and provide an opportunity for assessing and improving interoperability.

Joint and Combined Training

The best way to ensure Army components, Services, and allies have compatible systems and procedures is to conduct exercises that involve all parties. The Army has relied on RC participation in major exercises and deployments extensively in recent years. In fact, each rotation at Army CTCs includes RC participation, and one rotation each year at both the National Training Center (NTC) and the Joint Readiness Training Center (JRTC) is focused on an ARNG eSB.

The Army and other Services also participate in a robust program of joint and combined exercises each year. Chapter 2 highlighted several of these exercises from FY1999. These key events validate materiel interoperability as well as identify other interoperability issues. They also provide a valuable opportunity to ensure that the procedures of all parties optimize force effectiveness.

Incorporating common technologies and components in multiple platforms across the force, conducting experiments, and training are three processes that assure interoperability. The Army will build on these processes throughout its transformation to the Objective Force to sustain and improve interoperability across all components, within the joint team, and with our allies.
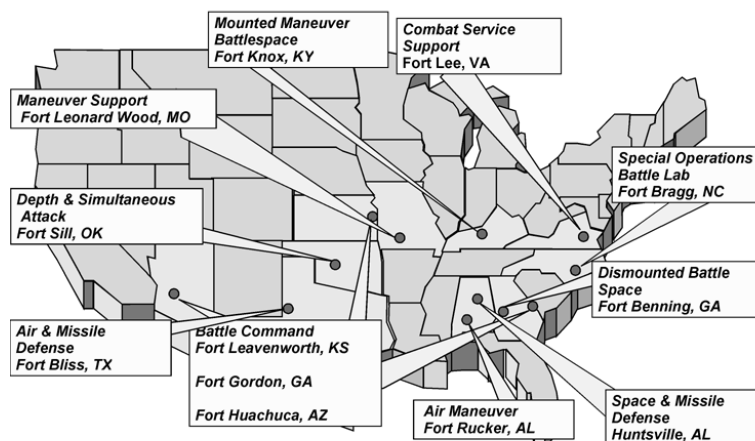
Battle Labs provide a mechanism for coordinating concept development, requirement generation, solution development, and operational testing.